

**MONITORING ALIGNMENT BETWEEN  
PULSE CARVERS AND PHASE MODULATORS IN OPTICAL SYSTEMS**

**ABSTRACT OF THE DISCLOSURE**

Timing alignment between a pulse carver (i.e., intensity modulator) and a phase  
5 modulator, e.g., in a return-to-zero (RZ) differential phase-shift keying (DPSK) optical  
transmitter, is monitored by filtering a signal from the transmitter and measuring the power of  
the filtered signal. In certain embodiments, the filter has a birefringent device (such as a  
polarization-maintaining fiber) and a polarizer. The polarizer may be a rotating polarizer with a  
rotating quarter-wave plate in front of it. In other embodiments, the filter is a periodic filter  
10 such as a Mach-Zehnder interferometer or an etalon filter. Regardless, the measured power may  
be used to generate control signals used to variably delay the signals that drive the phase  
modulator and/or the pulse carver to compensate for detected misalignment. The measured  
power may also be used to monitor the bit-error-rate degradation caused by timing misalignment  
between the pulse carver and the phase modulator.